

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5**

Purpose: Compliance Evaluation Inspection (CEI)

Facility: Flint Hills Resources – Pine Bend Refinery
12555 Clark Road
Rosemount, Minnesota 55068

NPDES Permit Number: MN000418

Date of Inspection: August 2 – 4, 2011

U.S. Environmental Protection Agency EPA Representatives:

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Report Prepared by:

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Report Date: March 2, 2012

Inspector Signature: _____



BACKGROUND

The U.S. Environmental Protection Agency (EPA) visited the Flint Hills Resource – Pine Bend Refinery (FHR or refinery) to conduct a compliance evaluation inspection (CEI). Mr. Gary Simonsen and Mr. Robert Kostinec of the MPCA also participated in the inspection. They were both present only on August 2nd. The purpose of the inspection was two-fold: to verify compliance with the current Consent Order (Order) between EPA and Koch Petroleum Group L.P., as well as with the refinery's existing National Pollutant Discharge Elimination System (NPDES) permit conditions.

The refinery was formerly known as Koch Petroleum Group L.P. (Koch). Although still owned by Koch, the refinery is now under Flint Hills Resources Pine Bend, LLC. This refinery employs about 900 people. At the time of the inspection, new employees were being hired and trained for diverse positions. The refinery has a crude oil processing capacity of about 320,000 barrels per day and it mostly processes Canadian crude that arrive via pipeline. Oil is processed into petroleum products including gasoline, jet fuel, diesel fuel, petcoke, liquefied petroleum gas, propane, butane, heating fuel for homes and businesses, and sulfur for fertilizer products. Flint Hills also produces about 900,000 gallons of asphalt daily.

The refinery operates several processes, including a crude processing unit, a coker (See Picture 1), a cracking unit, desulfurization units, and a wastewater treatment facility (WWTF), among others. The WWTF treats all process waters, storm water runoff, groundwater from Spring Lake Trench pumping system, caustic and oily waters. The refinery discharges pollutants through a point source designated as Outfall SD001 into the Mississippi River.

The Order was filed on June 20, 1989 (see Attachment 1 for a copy of the Order). It included the following requirements:

- Report on a quarterly basis the average daily production rates at the refinery for each calendar month in the previous quarter.
- Expand its wastewater treatment facilities (WWTF).
- Identify and eliminate the acute toxicity of its effluent by conducting a Toxicity Reduction Evaluation (TRE) and implement a Toxicity Reduction Plan (TRP).
- Quality Control Measures for the on-site Laboratory.
- Operation and Maintenance of its WWTF.
- Quarterly reports, including discharge monitoring reports (DMR), bench sheets, and transmittal letter for each month on that quarter.
- Stipulated Penalties

According to Paragraph 79 of the Order, the *“Order shall terminate twelve (12) months after [Koch] has completed the Expansion of WWTF requirement of Part V.B. of this Order and the TRE and TRP requirements of Part V.C. of this Order, whichever is later”* Part V.C. indicates that *“Koch shall conduct a TRE and perform a TRP to eliminate acute toxicity of its effluent and to comply with the acute toxicity effluent requirements of its NPDES permit.”* The Order also

indicates that once FHR, as successor to Koch, fulfilled the above requirements, the Consent Order would terminate without further action, provided that all penalty payments had been made.

The NPDES permit (# MN000418), issued on July 1, 2007, lists a few of the requirements in the Order, as well as all the effluent limitations and other conditions for its Outfall SD001. For instance, Chapter 1, Section 5 of the NPDES permit lists requirements for the Acute Whole Effluent Toxicity (WET) testing, a major component of the TRE. Chapter 4 lists requirements for Mercury (Hg) Minimization Plan implementation. Chapter 6 deals with the refinery's Industrial Storm Water Management, which includes conditions for a storm water pollution prevention plan (SWPPP). The refinery's NPDES permit expires on June 30, 2012 (See Attachment 2).

The WWTF

The refinery's WWTF has a calculated design maximum daily flow of 5.2 MGD. The WWTP is a system of separators, basins, and chemical treatment facilities that remove oil and other impurities from process waters. The system consists of the following treatment processes: pre-screening; oil/water separator; equalization basins; coagulation/flocculation; dissolved air flotation (DAF); powered activated carbon addition (PACT to provide non-toxicity to the effluent); activated sludge process with diffused air; final clarification; pH adjustment; and final effluent polishing ponds. The treatment system also includes an Alternative Waste Handling Facility. Here, discrete wastes collected at the refinery via vacuum trucks or similar on-site methods are separated, with generated wastewater treated at the WWTF and sludge recycled to the refinery processes or disposed of offsite as hazardous wastes. The sewer collection system at the refinery consists of process sewer system, clean water, and area drains (See Attachment 3 for a copy of the WWTF Flow Diagram, provided by the refinery).

Wastewaters generated at the site are: process wastewaters such as caustic and stripped sour waters; brine; contaminated storm water including runoff from the bottoms loading facility; and groundwater from Spring Lake Trench. Caustic wastewaters generated in the refinery process are discharged and treated using chemical and physical processes to generate boiler feed. Sour waters are treated to remove nitrogen and sulfur, and then discharged to the WWTF. Other process wastewaters include waters from the cooling towers, the heat exchanger, and from the hydrogen plants.

The clean water sewer conveys non-process storm water, boiler blowdown, and neutralized demineralized waters. These are discharged to either the North Fire Basin (B5), the Lower Basin, or to the WWTF. The refinery Coker Basin system collects and routes coke pile runoff and Coker Basin overflows to the WWTF.

Area drains throughout the refinery, including specific dry weather flows and other approved streams, converge at the main diversion box (See Picture 2). The storm water pond collects storm water generated in the process area, as well as overflow discharges of storm water from the diversion box. Collected storm water from this pond is reused for cooling tower makeup

water or in the firewater protection system. The term "firewater" used by the refinery refers to waters used to extinguish fire. The remaining effluent from the diversion box is pumped and routed to the WWTF.

Wastewaters generated at the WWTF include: wastewater sludge that is recycled back to the process; biological sludge waste that is recycled back to the coker unit; non-recyclable hazardous wastewater sludge, and final treated effluent that is discharged through Outfall SD001. The average rate discharge through this outfall is 4 MGD.

SITE INSPECTION

Upon arrival to the refinery on the first day, Mr. Baker welcomed the EPA representatives and each one showed his credentials. We also sat for about 10 minutes to watch a safety video to get familiar with the in-house safety procedures and contingency plan. The MPCA representatives joined the inspection, as well. During the opening conference, other refinery personnel participated. Mr. Lowell Miller-Stolte, of FHR, gave an overview about the entire refinery process from the moment the crude oil is first fractionated, until wastewaters are generated and treated at the refinery's WWTF. Another presentation, specifically about the operation of the WWTF was provided by Mr. Brown.

The walk-through the refinery started after lunch, around 1:10 pm. We first saw the main diversion box. The main diversion box conveys area drains to the 7th Street Pump Station (7PS, Pictures 3 - 4) and to the storm water pond. The 7PS is a NESHAP¹-controlled pump, required by a previous EPA settlement resolving violations of the Clean Air Act (CAA). The level of control provided by NESHAP prevents effluents from being contaminated with most volatile organic compounds (VOCs), including benzene, diesel range organics (DRO), and gasoline range organics (GRO).

The inspection crew proceeded to check out the coker ponds (See Pictures 5 - 6). At the time of the inspection, a significant amount of "firewater" was flowing into the ponds (See Pictures 7 - 8). From the coker ponds, the crew proceeded to inspect the WWTF. Incoming wastewater flow enters the API Separator (Pictures 9 - 10), where oil and water separates, and solids settle at the bottom. The oily top layer is skimmed off and recycled back to the refinery. Wastewater continues into the 7A/B Equalization Basin (See Picture 11). Incoming storm water from the diversion boxes finds its way to the equalization basin. Water is then treated at the DAF (See Picture 12), where rapid mixing and air brings the emulsified oil up to the surface for removal. The remaining wastewater goes through flocculation, where a charged cationic coagulant is added, followed by an anionic flocculant. Mercury (Hg) is also removed by addition of ferric sulfate. Solids settle, then are collected and finally shipped offsite as hazardous wastes.

The treatment process continues at three of the aeration basins (3A, 3B, and 3C) in the refinery (See Picture 13). Activated sludge treatment consists of the activity of 20 tons of bacteria per

¹ NESHAP stands for National Emission Standards for Hazardous Air Pollutants

day. Basically, the mixed liquor in these basins is about 50:50 carbon to bacteria. In addition to the influent coming from the DAF, incoming wastewater from B5 (See Picture 14), Lower Basin (See Picture 15), Spring Lake Remediation System, Firewater Defoamer Delivery System, as well as cooling tower blowdown, are treated at these basins. The final clarifiers (See Picture 16) then returns activated sludge back to the 3A basin, as the treated effluent continues through S7 Pump, where a 93 % sulfuric acid solution is added to control pH. From the clarifiers, treated water settles at the polishing ponds, where the final effluent is then discharged into the Mississippi River (See Picture 17).

Except for the final clarifiers, the waste-activated sludge holding tank, and the polishing ponds, the WWTF units are enclosed and held under negative pressure pursuant to the NESHAP. Vapor and gases from the enclosed units are collected and vented via a closed system to a thermal oxidizer (TO). This system was also a NESHAP required system, where the TO incinerates vapors and gases, reducing emissions of VOCs and odors prior to discharge to the atmosphere.

The last part of the on-site tour was to the polishing ponds, the flume, the outfall, and the Spring Lake Trench area (See Pictures 18 - 20).

DOCUMENT REVIEW

EPA receives and reviews the quarterly reports submitted by FHR, as required under Part VI, Paragraphs 30 – 33 of the Order. The most recent quarterly report (3rd Quarter 2011) was received on October 27, 2011. Each quarterly report contains a cover letter and a binder divided by sections, as follows:

- Section 1: Compliance and Deadline Summary
- Section 2: TRE Summary
- Section 3: DMRs
- Section 4: Laboratory Bench Sheets
- Section 5: Stipulated Penalties

The cover letter attached to the last quarterly report for 2010 indicated that one of the Plaintiffs, the Citizens for a Better Environment (CBE) has ceased to exist. On September 1, 2006, the former president of the Midwest Center for Environmental Science and Public Policy, the successor organization to CBE, informed FHR of this (See Attachment 4). Previously, the other Plaintiff, Atlantic States Legal Foundation (ASLF) informed FHR of its petition for termination. On May 13, 2008, an email from Mr. Mike Falk to Mr. Jon Bloomberg, Consultant for ASLF explained of ASLF's petition for closure (See Attachment 5). FHR is therefore no longer supplying copies of the quarterly reports to either one of these Plaintiffs.

DMRs from the last 5 years were reviewed during the inspection. Other documents concerning Chapter 6 of the NPDES: Industrial Storm Water Management, were reviewed by Mr. Newton Ellens.

Regarding the TRE, FHR performs the testing at specific quarters, as required. The last quarterly report of 2010 indicated that the Acute WET testing was performed on November 29, 2010 through December 2, 2010. The test exhibited failure rates for two of the test species (namely *Ceriodaphnia dubia* and *Pimephales promelas*). Follow up testing during the week of December 7, 2010 and the week of December 14, 2010, showed successful survival rates for all three test species. As reported as part of the First Quarter 2011 report, WET sample tests performed in January and February 2011 were all successful.

EXIT BRIEFING

During the exit briefing, I conversed with Mr. Chris Kuhns, WWTF Operator, and asked him a few questions regarding the operation and maintenance of the WWTF. Based on the information provided by Mr. Kuhns, and the document review conducted by EPA representatives, the requirements of the Order have been addressed, as follows:

- Report on a quarterly basis, the average daily production rates at the refinery for each calendar month in the previous quarter. **FHR has provided this information, requesting that EPA keep it confidential.**
- Expand its wastewater treatment facilities (WWTF). **Based on Mr. Kuhns responses and documents reviewed, FHR initiated expansion projects at the WWTF prior to 1989. During the inspection, it was evident that the WWTF is being properly operated and maintained. Additional improvements in various sections of the WWTF have taken place as part of a previous settlement for CAA violations.**
- Identify and eliminate the acute toxicity of its effluents by conducting a Toxicity Reduction Evaluation (TRE) and implement a Toxicity Reduction Plan (TRP). **FHR has continued to conduct WET testing as required. Although the WET testing conducted in November and December of 2010 failed, FHR continues its effort to address the toxicity issue and has complied with the toxicity limits.**
- Quality Control Measures for the on-site Laboratory. **FHR has continuously improved and updated the QA/QC for the on-site laboratory and has reported its progress in the quarterly reports.**
- Operation and Maintenance of its WWTF. **Based on Mr. Kuhns' responses, FHR is properly operating and maintaining the WWTF, as required in Section V. E of the Order.**
- Quarterly reports, including discharge monitoring reports (DMR), bench sheets, and transmittal letter for each month on that quarter. **FHR has been providing all this information as part of the quarterly reports. DMRs have been submitted on a monthly basis.**
- Stipulated Penalties. **No stipulated penalties were assessed.**

The exit briefing also including remarks from Mr. Newton Ellens, regarding his findings from reviewing documents required under Chapter 6 of the NPDES. Mr. Ellens's findings are listed as follows:

- NPDES Permit, Chapter 6, Condition 4.6 (b) - Drainage map, which doesn't show all of the discharge outfalls (e.g., there are no outfalls listed for the Tank 7 area or the sandblasting/painting area).
- NPDES Permit, Chapter 6, Condition 4.6 (c) - The map doesn't show the following receiving waters: Mississippi River, Spring Lake, Wetland north of Tank 7, and the drainage ditch northwest of refinery boundary (receiving storm water from the sandblasting/painting area).
- NPDES Permit, Chapter 6, Condition 4.6 (d) - The map doesn't show areas where significant materials are exposed to storm water (e.g., the coke storage area and various process pads).²
- NPDES Permit, Chapter 6, Condition 4.8 – Evaluation of areas where significant materials are exposed to storm water. The SWPPP includes an evaluation for eight Areas of Concern (where storm water drains directly to waters of the state), but not for other areas where significant materials are exposed to storm water. In addition, the Tank 7 area is an area of concern, but it is not included in the SWPPP.
- NPDES Permit, Chapter 6, Condition 4.6 (d) Outdoor Manufacturing/Processing
The SWPPP states that storm water is retained on-site, or discharged per the NPDES permit. However, there is no determination of whether there are discolored soils in these areas as a result of leaks or spills.
- NPDES Permit, Chapter 6, Condition 4.6 – Non Storm Water Discharge Certification (dated March 31, 2010). The certification lacks the following: Date of testing, Location of testing, description of method used to determine the source of discharges, and testing results.

RECOMMENDATION

Per Mr. Kuhns's interview, all requirements under Part V.B. of the Order have been completed. Regarding the TRE and TRP, FHR failed a WET testing in November 2010. Additional testing thereafter showed successful survival rates for the three test species. Regardless of this failure, FHR has been able to demonstrate that the acute toxicity of its effluent has been identified and eliminated for the most part. The most recent DMR, received on October 25, 2011, indicated that a WET testing (serial dilution) was conducted in September 2011. The testing was

² According to FHR staff, the refinery has a large, unmanageable number of areas where significant materials are exposed to storm water; the number of such areas is too large to account for in the SWPPP. In addition, storm water from many of these areas is either treated at the wastewater treatment plant or held in detention basins and evaluated before being discharged. Therefore, after consulting with the state, FHR only accounts for nine Areas of Concern—areas where (1) significant materials are exposed to storm water and (2) storm water drains directly to waters of the state. Mr. Ellens stated that the rationale behind omitting an account of areas where significant materials are exposed to storm water needs to be documented in the SWPPP.

conducted to demonstrate that a step-feed operation in the activated sludge system will not negatively impact the effluent quality. The test resulted in successful survival rates of all three test species (See Attachment 6). FHR has continued to address the toxicity issues in its effluent, complying with the requirements under Part V.C. of the Order. Therefore, Part V.C. of the Order is completed, satisfying the terms of the Order.

FHR is still responsible for complying with the current NPDES permit, and will need to address the storm water concerns identified by Mr. Ellens.

List of Attachments

1. June 1989 Consent Order
2. NPDES Permit
3. WWTP Flow Diagram
4. September 2006 letter from Midwest Center for Environmental Science and Policy to Flint Hills
5. May 2008 email from ASLF to Flint Hills
6. Discharge Monitoring Report dated October 19, 2011.
7. Copy of (documentation) from Flint Hills about paying the original penalty.
8. List of Pictures

Picture number	Description
1	Coker Unit
2	Main Diversion Box
3	NESHAP Control Sump Pumps (7 th Street Pump)
4	7 th Street Pump
5	Coker Pond (north view)
6	Coker Pond (south view)
7	South Fire Water inlet
8	South Fire Water Pond
9	API Separator (including pumps)
10	API Separator
11	7A/B Equalization Tank
12	New and Old DAF
13	Activated Sludge Tank (top)

14	B5 Basin
15	Lower Basin
16	One of the final effluent clarifiers
17	Outfall and diffusers
18	Polishing Ponds
19	Flume (Confined Space)
20	Outfall Barge